

EPOS4 Feature Chart

maxon's EPOS4 products are small-sized, full digital, smart positioning control units. Their high power density allows flexible use for brushed DC and brushless EC (BLDC) motors up to approximately 1'050 Watts with various feedback options, such as Hall sensors, incremental encoders as well as absolute sensors in a multitude of drive applications.

EPOS4 controllers are specially designed to be commanded and controlled as a slave node in a CANopen or EtherCAT network. In addition, the units can be operated via any USB or RS232 communication port of a Windows or Linux workstation. Moreover, the integrated extension interface allows pooling with optionally available communication interfaces or other additional functionalities.

Latest technology, such as field-oriented control (FOC), acceleration/velocity feed forward and dual loop control in combination with highest control cycle rates allow sophisticated, ease-of-use motion control.
























epos.maxongroup.com

Legend:

✓ = included / (✓) = on request / nnnnnn = order number / ** = available shortly / (a) requires an optionally available extension card (see "Accessories" on page 5 and page 12) / (b) optional for separate logic supply / (c) mandatory for supply of power stage / (d) with suitable motherboard


Product Overview












Modules		Ready-to-connect Units		
<p>Micro Find details as of page 2 CANopen EPOS4 Micro 24/5 CAN</p> 	<p>Module Find details as of page 2 CANopen EtherCAT</p> <p>EPOS4 Module 24/1.5</p>  <p>EPOS4 Module 50/5</p>  <p>EPOS4 Module 50/8</p>  <p>EPOS4 Module 50/15</p> 	<p>Compact CAN Find details as of page 6 CANopen</p> <p>EPOS4 Compact 24/1.5 CAN</p>  <p>EPOS4 Compact 50/5 CAN</p>  <p>EPOS4 Compact 50/8 CAN</p>  <p>EPOS4 Compact 50/15 CAN</p> 	<p>Compact EtherCAT Find details as of page 6 EtherCAT</p> <p>EPOS4 Compact 24/1.5 EtherCAT</p>  <p>EPOS4 Compact 50/5 EtherCAT</p>  <p>EPOS4 Compact 50/8 EtherCAT</p>  <p>EPOS4 Compact 50/15 EtherCAT</p> 	<p>Encased Housing Find details as of page 6 CANopen EtherCAT</p> <p>EPOS4 50/5</p>  <p>EPOS4 70/15</p> 

Modules	EPOS4 Micro 24/5 CAN (638328)	EPOS4 Module 24/1.5 (536630)	EPOS4 Module 50/5 (534130)	EPOS4 Module 50/8 (504384)	EPOS4 Module 50/15 (504383)
 for comparison purposes: US Half Dollar coin (Ø30.6 mm)					
Communication Interfaces					
CANopen Slave	max. 1 Mbit/s				
CANopen Application Layer and Communication Profile	CiA 301				
CANopen Layer Setting Services and Protocol (LSS)	CiA 305				
CANopen Device Profile Drives and Motion Control	CiA 402				
USB 2.0 / USB 3.0	Full speed				
Gateway function USB-to-CAN	✓				
RS232	max. 115'200 bit/s				
Gateway function RS232-to-CAN	✓				
EtherCAT Slave	—	✓ (a)	✓ (a)	✓ (a)	✓ (a)
IEC 61158 Digital data communication for measurement and control Fieldbus for use in industrial control systems	—	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)
IEC 61800-7 Generic interface and use of profiles for power drive systems	—	Profile type 1 (CiA 402)	Profile type 1 (CiA 402)	Profile type 1 (CiA 402)	Profile type 1 (CiA 402)
CAN application layer over EtherCAT (CoE)	—	✓	✓	✓	✓
File transfer over EtherCAT (FoE)	—	✓	✓	✓	✓
Distributed clocks support	—	✓	✓	✓	✓
Cyclic modes support cycle times down to...	—	1 ms	1 ms	1 ms	1 ms
Process data	—	PDO mapping (Variable)	PDO mapping (Variable)	PDO mapping (Variable)	PDO mapping (Variable)
Motors					
Brushed DC motors up to (continuous / max.)	120 W / 360 W	36 W / 108 W	250 W / 750 W	400 W / 1'500 W	750 W / 1'500 W
Brushless EC motors (BLDC) up to (continuous / max.)	120 W / 360 W	36 W / 108 W	250 W / 750 W	400 W / 1'500 W	750 W / 1'500 W
Sensors (Feedback)					
Digital Hall sensors (EC motors)	✓				
Digital incremental encoder (2-/3-channel, single-ended or differential)	✓				
Analog incremental encoder (3-channel, SinCos, differential)	—	✓	✓	✓	✓
SSI absolute encoder (configurable)	✓				
BiSS C absolute encoder (configurable)	—	(✓) (a)	(✓) (a)	(✓) (a)	(✓) (a)
EnDat 2.2 absolute encoder (configurable)	—	(✓) (a)	(✓) (a)	(✓) (a)	(✓) (a)
Commutation					
Digital Hall sensors	✓				
Digital Hall sensors + digital incremental encoder	✓				
Digital Hall sensors + analog incremental encoder	—	✓	✓	✓	✓
Digital Hall sensors + absolute encoder	✓				
Absolute encoder	✓				
Electrical Data					
Nominal power supply voltage (+V _{CC})	10...24 VDC	10...24 VDC	10...50 VDC	10...50 VDC	10...50 VDC
Nominal logic supply voltage (+V _C)	10...24 VDC	10...24 VDC	10...50 VDC	10...50 VDC	10...50 VDC
Absolute supply voltage limits (+V _{min} / +V _{max})	8 VDC / 28 VDC	8 VDC / 28 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC
Output voltage (max.)	0.9 x +V _{CC}				
Output current (I _{cont} / I _{max})	5 A / 15 A (<10 s)	1.5 A / 4.5 A (<30 s)	5 A / 15 A (<3 s)	8 A / 30 A (<5 s)	15 A / 30 A (<60 s)
Pulse width modulation frequency	50 kHz	100 kHz	50 kHz	50 kHz	50 kHz
Sampling rate PI current controller	25 kHz (40 μs)				
Sampling rate PI speed controller	2.5 kHz (400 μs)				
Sampling rate PID positioning controller	2.5 kHz (400 μs)				
Max. efficiency	98%	89%	97%	98%	98%
Max. speed DC motor	limited by max. permissible speed (motor)				
Max. speed EC motor, block commutation	100'000 rpm (1 pole pair)				
Max. speed EC motor, sinusoidal commutation	50'000 rpm (1 pole pair)				
Built-in motor choke	—				

Modules	EPOS4 Micro 24/5 CAN (638328)	EPOS4 Module 24/1.5 (536630)	EPOS4 Module 50/5 (534130)	EPOS4 Module 50/8 (504384)	EPOS4 Module 50/15 (504383)
Inputs / Outputs					
Digital Hall sensor signals	H1, H2, H3 (+2...+24 VDC, internal pull-up)				
Digital incremental encoder signals	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)				
Sensor signals	✓				
Digital incremental	—	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)
Analog incremental	—	A, A\, B, B\, I, I\ (±1.8 V differential, 10 kHz)	A, A\, B, B\, I, I\ (±1.8 V differential, 10 kHz)	A, A\, B, B\, I, I\ (±1.8 V differential, 10 kHz)	A, A\, B, B\, I, I\ (±1.8 V differential, 10 kHz)
Absolute serial SSI	Clock, Data (2.0...3.3 VDC, 0.4...2 MHz)	Clock, Clock\, Data, Data\ (EIA RS422, 0.4...2 MHz)	Clock, Clock\, Data, Data\ (EIA RS422, 0.4...2 MHz)	Clock, Clock\, Data, Data\ (EIA RS422, 0.4...2 MHz)	Clock, Clock\, Data, Data\ (EIA RS422, 0.4...2 MHz)
Digital inputs	4 (+2.1...+36 VDC)				
Digital outputs	2 (open collector, max. 36 VDC / 500 mA, internal pull-up)				
High-speed digital inputs	1 (2.0...3.3 V, 6.25 MHz)	4 (EIA RS422, 6.25 MHz)	4 (EIA RS422, 6.25 MHz)	4 (EIA RS422, 6.25 MHz)	4 (EIA RS422, 6.25 MHz)
High-speed digital outputs	1 (3.3 VDC/2 mA; 6.25 MHz)	1 (EIA RS422, 6.25 MHz)	1 (EIA RS422, 6.25 MHz)	1 (EIA RS422, 6.25 MHz)	1 (EIA RS422, 6.25 MHz)
Analog inputs (resolution 12-bit, -10...+10 V, 10 kHz, differential)	2				
Analog outputs (resolution 12-bit, -4...+4 V, 25 kHz)	1	2	2	2	2
STO inputs (optically isolated)	—	2 (+4.5...+30 VDC)	2 (+4.5...+30 VDC)	2 (+4.5...+30 VDC)	2 (+4.5...+30 VDC)
STO outputs (optically isolated with self-resetting short-circuit protection)	—	1 (max. 30 VDC / 15 mA)	1 (max. 30 VDC / 15 mA)	1 (max. 30 VDC / 15 mA)	1 (max. 30 VDC / 15 mA)
Sensor supply voltage	+5 VDC (I _L ≤150 mA)	+5 VDC (I _L ≤100 mA)	+5 VDC (I _L ≤100 mA)	+5 VDC (I _L ≤100 mA)	+5 VDC (I _L ≤100 mA)
Auxiliary output voltage	—	+5 VDC (I _L ≤150 mA)	+5 VDC (I _L ≤150 mA)	+5 VDC (I _L ≤150 mA)	+5 VDC (I _L ≤150 mA)
Status indicators (LEDs or bi-color LEDs)	Device status				
Connections					
A1...A80 Power supply Logic supply Motor Hall sensor Encoder Sensor Digital I/O Analog I/O RS232 CAN USB	Terminal/socket header (0.5 mm) 2x40 poles	—	—	—	—
A1...A46 Power supply Logic supply Motor Hall sensor Encoder	—	Box header (1.27 mm) 2x23 poles	Box header (1.27 mm) 2x23 poles	Pin header (2.54 mm) 2x16 poles	Pin header (2.54 mm) 2x16 poles
B1...B46 Sensor Digital I/O Analog I/O STO RS232 CAN	—	Box header (1.27 mm) 2x23 poles	Box header (1.27 mm) 2x23 poles	Pin header (2.54 mm) 2x23 poles	Pin header (2.54 mm) 2x23 poles
X13 USB	—	USB Type micro B, female	USB Type micro B, female	USB Type micro B, female	USB Type micro B, female
Mechanical Data					
Weight (approximate)	6 g	17 g	17 g	23 g	70 g
Dimensions (L x W x H)	32.0 x 22.0 x 7.0 mm	53.8 x 38.8 x 11.1 mm	53.8 x 38.8 x 11.1 mm	59.5 x 46.0 x 14.1 mm	59.5 x 62.0 x 16.4 mm
Mounting	Pluggable (female header 0.5 mm) or M2 screws	Pluggable (female headers 1.27 mm) or M2.5 screws	Pluggable (female headers 1.27 mm) or M2.5 screws	Pluggable (female headers 2.54 mm) or M2.5 screws	Pluggable (female headers 2.54 mm) or M3 screws
Environmental Conditions					
Temperature – Operation	-30...+45 °C	-30...+60 °C	-30...+45 °C	-30...+45 °C	-30...+25 °C
Temperature – Extended range and derating	+45...68.8 °C / -0.210 A/°C	+60...+73 °C / -0.115 A/°C	+45...+75 °C / -0.167 A/°C	+45...+77 °C / -0.250 A/°C	+25...+77 °C / -0.288 A/°C
Temperature – Storage	-40...+85 °C	-40...+85 °C	-40...+85 °C	-40...+85 °C	-40...+85 °C
Altitude – Operation	0...6'000 m MSL				
Altitude – Extended range	6'000...10'000 m MSL (for derating see «Hardware Reference»)				
Humidity (condensation not permitted)	5...90%				
Directives & Standards					
Generic	IEC/EN 61000-6-2; IEC/EN 61000-6-3				
Applied	IEC/EN 55022 (CISPR22); IEC/EN 61000-4-3; IEC/EN 61000-4-4; IEC/EN 61000-4-6				
Environment	IEC/EN 60068-2-6; MIL-STD-810F				
Safety (UL File Number; unassembled PCB)	E207844	E207844	E207844	E76251; E133472; E207844; E337862	E76251; E133472; E207844; E337862
Reliability (MIL-HDBK-217F; MTBF)	945'031 hours	611'610 hours	314'822 hours	245'451 hours	240'400 hours, with heat sink <3.1 K/W

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Functionality						
<i>Operating Modes</i>						
CST	Cyclic Synchronous Torque Mode			✓		
CSV	Cyclic Synchronous Velocity Mode			✓		
CSP	Cyclic Synchronous Position Mode			✓		
PVM	Profile Velocity Mode			✓		
PPM	Profile Position Mode			✓		
HMM	Homing Mode			✓		
Master Encoder Functionality				(✓)		
Step/Direction Functionality				(✓)		
Analog Set Value Functionality				CST / CSV		
<i>Features</i>						
Feed forward (acceleration/velocity for inertia and friction compensation)				✓		
Field-oriented Control (FOC)				✓		
Velocity observer				✓		
Dual loop control				✓		
Custom persistent memory				✓		
Advanced automatic control settings (Auto Tuning)				✓		
Safe Torque Off (based on IEC/EN 61800-5-2, not certified)		—	✓	✓	✓	✓
<i>Digital I/O Functionality</i>						
Inputs (configurable)				✓		
	Touch Probe			✓		
	Reference switches			✓		
	Limit switches			✓		
	Quickstop			✓		
	Drive Enable			✓		
	General purpose			✓		
Outputs (configurable)				✓		
	Position Compare			(✓)		
	Holding Brake			✓		
	Ready/Fault			✓		
	General purpose			✓		
<i>Analog I/O Functionality</i>						
Inputs (configurable)				✓		
	Analog set value			✓		
	General purpose			✓		
Outputs (configurable)				✓		
	Current monitor			(✓)		
	Velocity monitor			(✓)		
	Position monitor			(✓)		
	Temperature monitor			(✓)		
	General purpose			✓		
<i>Built-in Protection</i>						
Current limiter (adjustable)				✓		
Overcurrent				✓		
Thermal motor protection				✓		
Thermal controller protection				✓		
Overvoltage				✓		
Undervoltage				✓		
Voltage transients				✓		
Short-circuit of motor winding				✓		
Loss of feedback signal				✓		
Following error				✓		
Status reporting				✓		
Firmware error handling				✓		

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Software						
Installation Program	EPOS Setup					
Graphical User Interface	EPOS Studio					
	The EPOS video library features video tutorials that provide easy to follow instructions on how to get started with «EPOS Studio» and how to setup communication interfaces, motors and sensors, and so on. Explore on Vimeo: → https://vimeo.com/album/4646388					
						
Startup	✓					
Regulation Tuning	✓					
Firmware Update	✓					
Motion Commander	✓					
I/O Monitor	✓					
Parameters	✓					
Data Recording	✓					
Command Analyzer	✓					
CANopen Wizard	✓					
Online Help	✓					
Language	English					
Operating System	Windows 10, 8, 7					
Windows DLL for PC	32-bit / 64-bit					
CAN interfaces	IXXAT National Instruments Kvaser Vector					
Programming examples	Microsoft Visual Basic, Visual Basic.NET, Visual C#, Visual C++ Borland C++, Delphi National Instruments LabView, LabWindows/CVI					
Linux Shared Object Library	X86 32-bit/64-bit, ARMv6/v7/v8 32-bit, ARMv8 64-bit					
CAN interfaces	IXXAT Kvaser					
Programming examples	C++					
Accessories (not included in delivery)						
536997	EPOS4 CB 24/1.5 CAN (connector board)	—	✓	—	—	—
620048	EPOS4 CB 24/1.5 EtherCAT (connector board)	—	✓	—	—	—
534133	EPOS4 CB 50/5 CAN (connector board)	—	—	✓	—	—
620044	EPOS4 CB 50/5 EtherCAT (connector board)	—	—	✓	—	—
520884	EPOS4 CB Power CAN (connector board)	—	—	—	✓	✓
604594	EPOS4 CB Power EtherCAT (connector board)	—	—	—	✓	✓
638677	EPOS4 EB Micro (evaluation board)	✓	—	—	—	—
581245	EPOS4 EtherCAT Card	—	✓ (d)	✓ (d)	✓ (d)	✓ (d)
403968	USB Type A - micro B Cable	—	✓	✓	✓	✓


Ready-to-connect Units	EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
	CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
 for comparison purposes: US Half Dollar coin (Ø30.6 mm)										
Communication Interfaces										
CANopen Slave	max. 1 Mbit/s	—	max. 1 Mbit/s	—	max. 1 Mbit/s	—	max. 1 Mbit/s	—	max. 1 Mbit/s	max. 1 Mbit/s
CANopen Application Layer and Communication Profile	CiA 301	—	CiA 301	—	CiA 301	—	CiA 301	—	CiA 301	CiA 301
CANopen Layer Setting Services and Protocol (LSS)	CiA 305	—	CiA 305	—	CiA 305	—	CiA 305	—	CiA 305	CiA 305
CANopen Device Profile Drives and Motion Control	CiA 402	—	CiA 402	—	CiA 402	—	CiA 402	—	CiA 402	CiA 402
USB 2.0 / USB 3.0	Full speed									
Gateway function USB-to-CAN	✓	—	✓	—	✓	—	✓	—	✓	✓
RS232	max. 115'200 bit/s	—	max. 115'200 bit/s	—	max. 115'200 bit/s	—	max. 115'200 bit/s	—	max. 115'200 bit/s	max. 115'200 bit/s
Gateway function RS232-to-CAN	✓	—	✓	—	✓	—	✓	—	✓	✓
EtherCAT Slave	—	✓	—	✓	—	✓	—	✓	✓ (a)	✓ (a)
IEC 61158 Digital data communication for measurement and control Fieldbus for use in industrial control systems	—	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	—	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	—	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	—	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)	Type 12 (EtherCAT) max. 100 Mbit/s (100 Base Tx)
IEC 61800-7 Generic interface and use of profiles for power drive systems	—	Profile type 1 (CiA 402)	—	Profile type 1 (CiA 402)	—	Profile type 1 (CiA 402)	—	Profile type 1 (CiA 402)	Profile type 1 (CiA 402)	Profile type 1 (CiA 402)
CAN application layer over EtherCAT (CoE)	—	✓	—	✓	—	✓	—	✓	✓	✓
File transfer over EtherCAT (FoE)	—	✓	—	✓	—	✓	—	✓	✓	✓
Distributed clocks support	—	✓	—	✓	—	✓	—	✓	✓	✓
Cyclic modes support cycle times down to...	—	1 ms	—	1 ms	—	1 ms	—	1 ms	1 ms	1 ms
Process data	—	PDO mapping (Variable)	—	PDO mapping (Variable)	—	PDO mapping (Variable)	—	PDO mapping (Variable)	PDO mapping (Variable)	PDO mapping (Variable)
Motors										
Brushed DC motors up to (continuous / max.)	36 W / 108 W	36 W / 108 W	250 W / 750 W	250 W / 750 W	400 W / 1'500 W	400 W / 1'500 W	750 W / 1'500 W	750 W / 1'500 W	250 W / 750 W	1'050 W / 2'100 W
Brushless EC motors (BLDC) up to (continuous / max.)	36 W / 108 W	36 W / 108 W	250 W / 750 W	250 W / 750 W	400 W / 1'500 W	400 W / 1'500 W	750 W / 1'500 W	750 W / 1'500 W	250 W / 750 W	1'050 W / 2'100 W
Sensors (Feedback)										
Digital Hall sensors (EC motors)	✓									
Digital incremental encoder (2-/3-channel, single-ended or differential)	✓									
Analog incremental encoder (3-channel, SinCos, differential)	✓									
SSI absolute encoder (configurable)	✓									
BiSS C absolute encoder (configurable)	—	—	—	—	—	—	—	—	(✓) (a)	(✓) (a)
EnDat 2.2 absolute encoder (configurable)	—	—	—	—	—	—	—	—	(✓) (a)	(✓) (a)

Ready-to-connect Units	EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
	CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
Commutation										
Digital Hall sensors	✓									
Digital Hall sensors + digital incremental encoder	✓									
Digital Hall sensors + analog incremental encoder	✓									
Digital Hall sensors + absolute encoder	✓									
Absolute encoder	✓									
Electrical Data										
Nominal power supply voltage (+V _{CC})	10...24 VDC	10...24 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...70 VDC
Nominal logic supply voltage (+V _C)	10...24 VDC	10...24 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...50 VDC	10...70 VDC
Absolute supply voltage limits (+V _{min} / +V _{max})	8 VDC / 28 VDC	8 VDC / 28 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 56 VDC	8 VDC / 75 VDC
Output voltage (max.)	0.9 x +V _{CC}									
Output current (I _{cont} / I _{max})	1.5 A / 4.5 A (<30 s)	1.5 A / 4.5 A (<30 s)	5 A / 15 A (<3 s)	5 A / 15 A (<3 s)	8 A / 30 A (<5 s)	8 A / 30 A (<5 s)	15 A / 30 A (<60 s)	15 A / 30 A (<60 s)	5 A / 15 A (<15s)	15 A / 30 A (<60 s)
Pulse width modulation frequency	100 kHz	100 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz	50 kHz
Sampling rate PI current controller	25 kHz (40 μs)									
Sampling rate PI speed controller	2.5 kHz (400 μs)									
Sampling rate PID positioning controller	2.5 kHz (400 μs)									
Max. efficiency	89%	88%	97%	97%	98%	98%	98%	98%	98%	98%
Max. speed DC motor	limited by max. permissible speed (motor)									
Max. speed EC motor, block commutation	100'000 rpm (1 pole pair)									
Max. speed EC motor, sinusoidal commutation	50'000 rpm (1 pole pair)									
Built-in motor choke	3 x 94 μH; 1.5 A	3 x 100 μH; 1.5 A	3 x 9.4 μH; 5 A	3 x 10 μH; 5 A	3 x 2.2 μH; 15 A	3 x 2.2 μH; 15 A	3 x 2.2 μH; 15 A	3 x 2.2 μH; 15 A	3 x 15 μH; 5 A	3 x 15 μH; 15 A
Inputs / Outputs										
Digital Hall sensor signals	H1, H2, H3 (+2...+24 VDC, internal pull-up)									
Digital incremental encoder signals	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)									
Sensor signals	✓									
Digital incremental	A, A\, B, B\, I, I\ (EIA RS422, 6.25 MHz)									
Analog incremental	A, A\, B, B\, I, I\ (±1.8 V differential, 10 kHz)									
Absolute serial SSI	Clock, Clock\, Data, Data\ (EIA RS422, 0.4...2 MHz)									
Digital inputs	4; level selectable by DIP switch: (Logic level: +2.0...+30 VDC) or (PLC level: +9.0...+30 VDC)									
Digital outputs	2 (open collector, max. 36 VDC / 500 mA, internal pull-up)									
High-speed digital inputs	4 (EIA RS422, 6.25 MHz)									
High-speed digital outputs	1 (EIA RS422, 6.25 MHz)									
Analog inputs	2 (resolution 12-bit, -10...+10 V, 10 kHz, differential)									
Analog outputs	2 (resolution 12-bit, -4...+4 V, 25 kHz)									
STO inputs	2 (+4.5...+30 VDC, optically isolated)									
STO outputs	1 (max. 30 VDC / 15 mA, optically isolated with self-resetting short-circuit protection)									
Sensor supply voltage	+5 VDC (I _L ≤100 mA)									
Auxiliary output voltage	+5 VDC (I _L ≤150 mA)									

Ready-to-connect Units		EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
		CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
Status indicators (LEDs or bi-color LEDs)		Device status									
		—	NET status	—	NET status	—	NET status	—	NET status	NET status	NET status
		—	NET port	—	NET port	—	NET port	—	NET port	NET port	NET port
Connections											
X1	Power supply	—	—	—	—	Molex Mega-Fit 2 poles	Molex Mega-Fit 2 poles	Molex Mega-Fit 2 poles	Molex Mega-Fit 2 poles	Molex Mini-Fit Jr. 2 poles	Molex Mega-Fit 2 poles
X2	Logic supply	—	—	—	—	Molex Mini-Fit Jr. 2 poles	Molex Mini-Fit Jr. 2 poles	Molex Mini-Fit Jr. 2 poles	Molex Mini-Fit Jr. 2 poles	Molex Mini-Fit Jr., 2 poles	Molex Mini-Fit Jr. 2 poles
X1/X2	Power & logic Supply	Harting har-flexicon 3 poles	Harting har-flexicon 3 poles	Harting har-flexicon 3 poles	Harting har-flexicon 3 poles	—	—	—	—	—	—
X3	Motor	—	—	Molex Mini-Fit Jr. 4 poles	Molex Mini-Fit Jr. 4 poles	—	—	—	—	Molex Mini-Fit Jr. 4 poles	—
X3a	Motor ($I_{cont} \leq 11$ A)	—	—	—	—	Molex Mini-Fit Jr. 4 poles	Molex Mini-Fit Jr. 4 poles	Molex Mini-Fit Jr. 4 poles	Molex Mini-Fit Jr. 4 poles	—	Molex Mini-Fit Jr. 4 poles
X3b	Motor ($I_{cont} \leq 15$ A)	—	—	—	—	—	—	Molex Mega-Fit 4 poles	Molex Mega-Fit 4 poles	—	Molex Mega-Fit 4 poles
X3c	Motor	Hirose DF3DZ 3 poles	Hirose DF3DZ 3 poles	—	—	—	—	—	—	—	—
X3a/X4a	Motor & Hall sensor	Harting har-flexicon 8 poles	Harting har-flexicon 8 poles	—	—	—	—	—	—	—	—
X3b/X4b	Motor & Hall sensor	Lumberg Minimodul 8 poles	Lumberg Minimodul 8 poles	—	—	—	—	—	—	—	—
X4	Hall sensor	—	—	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles	Molex Micro-Fit 3.0 6 poles
X5	Encoder	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles	Pin header 2.54 mm 2x5 poles
X6	Sensor	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate 2x5 poles
X7	Digital I/O	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles
X8	Analog I/O	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles	Molex CLIK-Mate 7 poles
X9	STO	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles	Molex CLIK-Mate 8 poles
X10	RS232	Molex CLIK-Mate 5 poles	—	Molex CLIK-Mate 5 poles	—	Molex CLIK-Mate 5 poles	—	Molex CLIK-Mate 5 poles	—	Molex CLIK-Mate 5 poles	Molex CLIK-Mate 5 poles
X11	CAN 1	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	Molex CLIK-Mate 4 poles
X12	CAN 2	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	—	Molex CLIK-Mate 4 poles	Molex CLIK-Mate 4 poles
X13	USB	USB Type micro B, female									
X14	Extension IN (a)	—	RJ45 10/100-BASE-TX	—	RJ45 10/100-BASE-TX	—	RJ45 10/100-BASE-TX	—	RJ45 10/100-BASE-TX	RJ45 10/100-BASE-TX	RJ45 10/100-BASE-TX
X15	Extension OUT (a)	—	RJ45 10/100-BASE-TX	—	RJ45 10/100-BASE-TX	—	RJ45 10/100-BASE-TX	—	RJ45 10/100-BASE-TX	RJ45 10/100-BASE-TX	RJ45 10/100-BASE-TX
X16	Extension signal (a)	—	—	—	—	—	—	—	—	Molex CLIK-Mate 2x5 poles	Molex CLIK-Mate, 2x5 poles

Ready-to-connect Units	EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
	CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
Mechanical Data										
Weight (approximate)	58 g	78 g	58 g	76 g	86 g	100 g	126 g	140 g	206 g	372 g
Dimensions (L x W x H) [mm]	55.0 x 40.0 x 31.1	56.5 x 55.0 x 31.7	55.0 x 40.0 x 31.1	56.5 x 55.0 x 31.7	59.5 x 58.5 x 33.0	59.5 x 79.5 x 35.7	59.5 x 65.5 x 35.1	59.5 x 79.5 x 37.0	105.0 x 83.0 x 38.7	125.0 x 94.5 x 38.7
Mounting	M2.5 screws	M2.5 screws	M2.5 screws	M2.5 screws	M2.5 screws	M2.5 screws	M3 screws	M3 screws	M4 screws	M4 screws
Environmental Conditions										
Temperature – Operation	-30...+45 °C	-30...+45 °C	-30...+25 °C	-30...+25 °C	-30...+45 °C	-30...+45 °C	-30...+25 °C	-30...+25 °C	-30...+50 °C	-30...+50 °C
Temperature – Extended range and derating	+45...+70 °C -0.060 A/°C	+45...+70 °C -0.060 A/°C	+25...+70 °C -0.111 A/°C	+25...+70 °C -0.111 A/°C	+45...+77 °C -0.250 A/°C	+45...+77 °C -0.250 A/°C	+25...+77 °C -0.288 A/°C	+25...+77 °C -0.288 A/°C	+50...+80 °C -0.167 A/°C	+50...+85 °C -0.429 A/°C
Temperature – Storage	-40...+85 °C									
Altitude – Operation	0...6'000 m MSL									
Altitude – Extended range	6'000...10'000 m MSL (for derating see «Hardware Reference»)									
Humidity (condensation not permitted)	5...90%									
Directives & Standards										
Generic	IEC/EN 61000-6-2; IEC/EN 61000-6-3									
Applied	IEC/EN 55022 (CISPR22); IEC/EN 61000-4-3; IEC/EN 61000-4-4; IEC/EN 61000-4-6									
Environment	IEC/EN 60068-2-6; MIL-STD-810F									
Safety (UL File Number; unassembled PCB)	E207844	E207844	E207844	E207844	E76251; E116354; E133472; E207844; E337862	E76251; E133472; E207844; E337862	E76251; E116354; E133472; E207844; E337862	E76251; E133472; E207844; E337862	E229342	E207844
Reliability (MIL-HDBK-217F; MTBF)	326'977 hours	279'388 hours	253'865 hours	238'623 hours	210'109 hours	197'129 hours	199'049 hours, with heat sink <3.1 K/W	179'777 hours, with heat sink <3.1 K/W	296'741 hours	254'446 hours
Functionality										
Operating Modes										
CST	Cyclic Synchronous Torque Mode				✓					
CSV	Cyclic Synchronous Velocity Mode				✓					
CSP	Cyclic Synchronous Position Mode				✓					
PVM	Profile Velocity Mode				✓					
PPM	Profile Position Mode				✓					
HMM	Homing Mode				✓					
Master Encoder Functionality					(✓)					
Step/Direction Functionality					(✓)					
Analog Set Value Functionality					CST / CSV					

Ready-to-connect Units	EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
	CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
Features										
Feed forward (acceleration/velocity for inertia and friction compensation)						✓				
Field-oriented Control (FOC)						✓				
Velocity observer						✓				
Dual loop control						✓				
Custom persistent memory						✓				
Advanced automatic control settings (Auto Tuning)						✓				
Safe Torque Off (based on IEC/EN 61800-5-2, not certified)						✓				
Digital I/O Functionality										
Inputs (configurable)						✓				
Touch Probe						✓				
Reference switches						✓				
Limit switches						✓				
Quickstop						✓				
Drive Enable						✓				
General purpose						✓				
Outputs (configurable)						✓				
Position Compare						(✓)				
Holding Brake						✓				
Ready/Fault						✓				
General purpose						✓				
Analog I/O Functionality										
Inputs (configurable)						✓				
Analog set value						✓				
General purpose						✓				
Outputs (configurable)						✓				
Current monitor						(✓)				
Velocity monitor						(✓)				
Position monitor						(✓)				
Temperature monitor						(✓)				
General purpose						✓				

Ready-to-connect Units	EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
	CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
Built-in Protection										
Current limiter (adjustable)						✓				
Overcurrent						✓				
Thermal motor protection						✓				
Thermal controller protection						✓				
Overvoltage						✓				
Undervoltage						✓				
Voltage transients						✓				
Short-circuit of motor winding						✓				
Loss of feedback signal						✓				
Following error						✓				
Status reporting						✓				
Firmware error handling						✓				
Software										
Installation Program	EPOS Setup									
Graphical User Interface	EPOS Studio									
	<p>The EPOS video library features video tutorials that provide easy to follow instructions on how to get started with «EPOS Studio» and how to setup communication interfaces, motors and sensors, and so on. Explore on Vimeo: → https://vimeo.com/album/4646388</p> 									
Startup	✓									
Regulation Tuning	✓									
Firmware Update	✓									
Motion Commander	✓									
I/O Monitor	✓									
Parameters	✓									
Data Recording	✓									
Command Analyzer	✓									
CANopen Wizard	✓									
Online Help	✓									
Language	English									
Operating System	Windows 10, 8, 7									
Windows DLL for PC	32-bit / 64-bit									
CAN interfaces	IXXAT National Instruments Kvaser Vector									
Programming examples	Microsoft Visual Basic, Visual Basic.NET, Visual C#, Visual C++ Borland C++, Delphi National Instruments LabView, LabWindows/CVI									
Linux Shared Object Library	X86 32-bit/64-bit, ARMv6/v7/v8 32-bit, ARMv8 64-bit									
CAN interfaces	IXXAT Kvaser									
Programming examples	C++									

Ready-to-connect Units	EPOS4 Compact 24/1.5		EPOS4 Compact 50/5		EPOS4 Compact 50/8		EPOS4 Compact 50/15		EPOS4 50/5 (546047)	EPOS4 70/15 (594385)
	CAN (546714)	EtherCAT (628092)	CAN (541718)	EtherCAT (628094)	CAN (520885)	EtherCAT (605298)	CAN (520886)	EtherCAT (605299)		
Accessories (not included in delivery)										
520858	✓	—	✓	—	✓	—	✓	—	✓	✓
520857	✓	—	✓	—	✓	—	✓	—	✓	✓
275934	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
422827	—	✓	—	✓	—	✓	—	✓	✓	✓
275878	—	—	✓	✓	✓	✓	✓	✓	✓	✓
275851	—	—	✓	✓	✓	✓	✓	✓	✓	✓
520851	—	—	—	—	—	—	✓	✓	—	✓
275829	—	—	—	—	✓ (b)	✓ (b)	✓ (b)	✓ (b)	✓	✓ (b)
520850	—	—	—	—	✓ (c)	✓ (c)	✓ (c)	✓ (c)	—	✓ (c)
520856	✓	—	✓	—	✓	—	✓	—	✓	✓
520852	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
520854	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
520853	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
403968	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
520860	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)
520859	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
581245	—	—	—	—	—	—	—	—	✓	✓

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